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Lewis Research Center



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Evaluation of Rotating, Incompressibly Lubricated, Pressurized Thrust Bearings

The problem:

To analyze the operation of an orifice-compensated (or capillary-compensated) thrust bearing, including the rotational effects and the effects of any adjoining journal bearings. Since the speed sharing between the fluid-film and the ball bearings depends on the torque characteristics of the two component bearings, the fluid-film bearing must be properly sized in order to obtain a useful reduction in ball bearing speed and provide adequate load capacity.

There appears to be no published information on rotating, compensated, pressurized thrust bearings using incompressible lubricants.

The solution:

An analytical method and a computer program which enable the rapid evaluation of pressurized thrust bearings which use an incompressible lubricant.

How it's done:

The program was used to evaluate a series-hybrid, fluid-film ball bearing consisting of an orifice compensated pressurized thrust bearing in conjunction with a self-acting journal bearing. Oil viscosities corresponding to experimentally measured ball bearing outer-race temperatures were used in the computer program. Points for the analytical curve were obtained from plots of measured bearing

torque. The analysis indicated that, when the supply pressure became high enough to lift off the fluid-film thrust bearing, the intermediate speed dropped abruptly. After lift off, the intermediate speed would rise at a slightly lower rate than the shaft speed. Results of the computer program agree well with the experimental data.

Notes:

1. This program is written in FORTRAN IV for use on the IBM-7094 computer, and may be used with any computer that has a FORTRAN IV compiler.
2. The program has the capability to handle input and output in either U.S. customary or metric (SI) units.
3. Requests for further information may be directed to:

COSMIC
112 Barrow Hall
University of Georgia
Athens, Georgia 30601
Reference: B71-10509

Patent status:

No patent action is contemplated by NASA.

Source: D.P. Fleming
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